

Tompkins Cortland Community College
Master Course Syllabus

Course Discipline and Number: BIOL 216

Year: 2024-2025

Course Title: General Microbiology

Credit Hours: 4

Attendance Policy: *To maintain good grades, regular attendance in class is necessary. Absence from class is considered a serious matter and absence never excuses a student from class work. It is the responsibility of all instructors to distribute reasonable attendance policies in writing during the first week of class. Students are required to comply with the attendance policy set by each of their instructors. Students are not penalized if they are unable to attend classes or participate in exams on particular days because of religious beliefs, in accordance with Chapter 161, Section 224-a of the Education Law of the State of New York. Students who plan to be absent from classroom activity for religious reasons should discuss the absence in advance with their instructors. See college catalog for more information.*

Services for Students with Disabilities: *It is the College's policy to provide, on an individual basis, appropriate academic adjustments for students with disabilities, which may affect their ability to fully participate in program or course activities or to meet course requirements. Students with disabilities should contact the Coordinator of Access and Equity Services, to discuss their particular need for accommodations. All course materials are available in alternate formats upon request.*

Course Description

Intended for students pursuing advanced studies in the biological science and health fields, and for individuals with a serious interest in the microbial world. Fundamental concepts and principles of microbiology, their application to the health sciences, and the relationship between microbes and our society are covered. Current topics of discussion include infectious disease and immunity, STDs, bioterrorism, and environmental issues. Substantial outside preparation for inquiry-based laboratories is required. BIOL 216 fulfills the SUNY General Education Natural Sciences requirement. Prerequisites: BIOL 101 and 102, or BIOL 104; MATH 095 or MATH 098 if required by placement testing; prior completion or concurrent enrollment in ENGL 101. 4 Cr. (3 Lec., 3 Lab.) Spring semester.

Course Context/Audience

General Microbiology is designed for students who are interested in a broad range of careers in the medical, biological, natural, or food sciences areas. The course encompasses all fields of Microbiology from basic scientific principles, to fundamental concepts in infection, disease, and immunity, to applied biotechnology. In order to prepare students for advanced studies, the course tests the students' abilities for recall, analysis, and understanding. Additionally, students' motivation to learn independently and their capacity to rationally evaluate print material is fostered. Students' demonstrated mastery of the broad subject matter covered in General Microbiology reflects on their capacity to succeed in a 4-year degree program.

Basic Skills/Entry Level Expectations

Writing:	WC	College level writing skills are required. See course co-requisites or pre-requisites.
Math:	M4	MATH 095 or MATH 098 if required by placement testing..
Reading:	R4	Before taking this course, students must satisfactorily complete RDNG 116 or have assessment indicating that no reading course was required.

Course Goals

Upon successful completion of this course, the student will be able to demonstrate his/her knowledge about the principles and concepts applied in microbiology, significant discoveries and developments in the field of microbiology, and the interplay between microbial virulence and host defense mechanisms. He/she will have acquired skills related to independent learning and inquiry and will have gained an appreciation for the prevalence of microbes on the human body and in the surrounding environment.

Course Objectives/Topics

Objective/Topic	% Course
Students will understand the fundamentals of microbiology; the guiding principles, discoveries and current concepts, microbial metabolism, growth, and genetics.	20%
Students will be able to categorize microbes into their respective domains; to differentiate between pro- and eukaryotes, bacteria, viruses, fungus, and parasites.	10%
Students will acquire an understanding of the interaction between microbe and host; virulence factors, epidemiology, resistance, immunity, and pathogenesis.	15%
Students will be able to identify medically important pathogens relevant to human disease, their source and available treatment.	15%
Students will appreciate the importance of microbes in the environment and in applied technologies; biotechnology, waste treatment, and the food industry.	5%
Students will acquire and demonstrate their ability to perform independent study through scientific inquiry.	25%
Students will learn how to evaluate and critically review articles of scientific merit written for the layperson.	10%

General Education Goals - Critical Thinking & Social/Global Awareness

CRITICAL THINKING OUTCOMES	HOW DOES THE COURSE ADDRESS THE OUTCOMES (Include required or recommended instructional resources, strategies, learning activities, assignments, etc., that must or could be used to address the goal/outcomes)
<p>Students will be able to</p> <ul style="list-style-type: none"> ➤ develop meaningful questions to address problems or issues. ➤ gather, interpret, and evaluate relevant sources of information. ➤ reach informed conclusions and solutions. ➤ consider analytically the viewpoints of self and others. 	<p>The course entails inquiry based labs where the student formulates a hypothesis and begins developing methods to test their query. Each week direct students toward developing a testable hypothesis. 1st read primary research papers related to microbiology. Then force the students to pose a query and formulate a hypothesis around it.</p> <p>Students begin to research previous published work related to their hypothesis and investigate appropriate methods to address their problem. The bioinformatics project encompasses all these facets. Introduce new techniques to the student, asking the students to find the appropriate resource/reference and techniques unique to their project. The bioinformatics case scenario outlines a step by step, group activity to begin research employing the NCBI data base. Require students to prepare a lecture presentation on a select topic in medical microbiology.</p> <p>Students analyze data relative to its validity and accuracy toward falsifying their hypothesis. Students must compile data and present group work for bioinformatics. Over the course of the semester, divide the project into manageable segments, requiring a status report to keep the student on task. The bioinformatics also requires weekly updates on task completion.</p> <p>Students submit a formal lab report, evaluated by the instructor, addressing their findings in light of previous knowledge. Bioinformatics requires consensus on group work to be presented to their peers. Final reports should be resubmitted for revisions taking into account comments of the instructor. Groups present and defend their conclusions for predicting the pending epidemic to their peers. Student's lectures/presentations should be evaluated by their peers.</p>

SOCIAL/GLOBAL AWARENESS OUTCOMES	HOW DOES THE COURSE ADDRESS THE OUTCOMES (Include required or recommended instructional resources, strategies, learning activities, assignments, etc., that must or could be used to address the goal/outcomes)
<ul style="list-style-type: none"> ➤ Students will begin to understand how their lives are shaped by the complex world in which they live. ➤ Students will understand that their actions have social, economic and environmental consequences. 	<p>Students learn of the complex, intertwined microbial habitats that led to and sustain life as we know it. Use each chapter to enlighten the student of our dependence on microbial life and what would happen if any segment were lost, or goes awry.</p> <p>Students learn how scientific discoveries, beginning in the 17th century to current time, have led to societal changes, not only from a health perspective but understanding some mental diseases as well. Discuss the social impact of each Nobel prize winning discovery and the resultant health policies that were enacted to improve our (human) quality of life. In light of current extra terrestrial exploration have students discuss how discovery of life outside of this biosphere will impact humanity.</p> <p>Students learn that scientific discovery and technology go hand in hand. Each is dependent on funding from government funds, benevolent gifts, or private venture capital. Bring into discussion how each new discovery (medical, pharmaceutical, and biotechnology) leads to new industries and job opportunities.</p> <p>Students learn of the symbiotic interactions between microbial life and multicellular organisms in this biosphere. The impacts of current practices on these interactions are covered. Several chapters address food micro, environment micro, bioremediation and emerging infectious disease. Discuss the benefits and drawbacks associated with current modern human practices and behaviors.</p>

Instructional Methods

Microbiology generally follows a historical perspective of landmark achievements to current concepts. Facts should be introduced from a general perspective first before moving to specific detail. Fundamental principles and concepts should be brought together toward understanding the pathogenesis of microbial infections. The use of case studies as a teaching tool is appropriate. Relevant laboratory exercises should be included to demonstrate basic technical advancements in the related fields of Microbiology. To enhance learning and foster independent study, the instructor should consider awarding additional grade credit for activities such as self-study that leads to a deeper understanding of basic concepts and for evaluations of articles for scientific merit, etc.

Methods of Assessment/Evaluation

Method	% Course Grade
Quiz Material	28%
Exam	20%
Lab Reports	10%
Research Notebook	5%
Bioinformatics	12%
Class Presentation	10%
Final Exam	15%

Text(s)

Microbiology An Introduction, GJ Tortora, BR Funke, and CL Case, 10th Edition, editors; Benjamin/Cummins Publishing Company, Inc., Menlo Park, CA.

Bibliography

Microbiology, L.M. Prescott, J.P. Harley, and D.A. Klein, eds., 5th edition, McGraw Hill Publishing Company, New York, NY, © 2002.

Field's Virology. B.N. Fields, D.M. Knipe, and P.M. Howley. 3rd edition. Philadelphia: Lippincott-Raven, © 1996.

Bergey's Manual of Determinative Bacteriology. Holt, John G., ed., 9th edition, Williams and Wilkins, © 1994.

Other Learning Resources

Audiovisual

No resources specified

Electronic

MEDSCAPE's Infectious Diseases MedPulse(R) medscape.com/infectiousdiseaseshome

MedPulse is a weekly index of key news and features on Medscape's specialty sites compiled by Medscape's editors.

BIOLINK <http://www.bio-link.org/index.htm>

The National Center for Case Study Teaching in Science Case Collection

<http://ublib.buffalo.edu/libraries/projects/cases/ubcase.htm>

Other

No resources specified